THE FEASIBILITY OF USING EXPERT SYSTEMS IN THE MANAGEMENT OF HUMAN RESOURCES

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Abstract

The purpose of this paper is to introduce a decision aid that is being used increasingly in the business world, the expert system, and to begin to examine its potential for human resource management.

First, the expert system technology is reviewed, with a special emphasis on the players, those involved in developing and using the system, and the parts, the three main components of a system. This is followed by an analysis of the costs and benefits and the advantages and disadvantages that have been ascribed to expert systems.

We conclude this initial research endeavor by presenting some preliminary findings which suggest that employees are willing to cooperate with expert systems, even those that require personal information, and that they see some benefits to using expert systems as decision aids.

INTRODUCTION

Less than twenty years ago, tools for the personnel manager included a personnel manual, a union contract, an array of record keeping forms, a ream of carbon paper, a telephone, and even a company picnic. Like other management functions, which have evolved from the adding machine era through the calculator era to the computer era, human resource management has adopted many innovations. In spite of their value as a means for improving the efficiency and effectiveness of the organization, some have engendered strong resistance.

Not only have the tools that human resource professionals use changed, of late, so has the role that human resource management plays in the business. Today, the function is often referred to as a business partner--an equal and necessary function responsible not only for the acquisition, retention, and well-being of a talented work force, but also accountable for a contribution to the firm's bottom line, its profits.

The purpose of this paper is to introduce another, newer tool, the expert system, and to examine its potential as a decision aid for human resource management.

CAPTURING, ORGANIZING, AND DISSEMINATING EXPERT KNOWLEDGE

The Players

The challenge to designing an expert system is to capture and encode the wisdom of the expert(s) so that the computer will mimic the decision outcomes of the expert for those who use it. Figure 1 depicts how the knowledge engineer accomplishes this by

serving as an intermediary between the domain expert and the clients, or end users (Gaines, 1987).

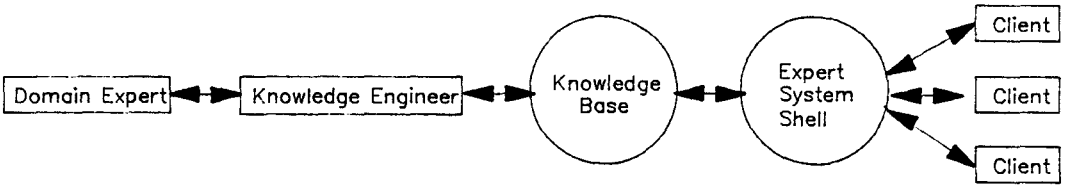

Figure 1 Development of an Expert System

The knowledge engineer is someone who knows the intricacies of expert systems: their capabilities, their limitations, and their languages. The knowledge engineer need not possess any specific knowledge about the situation, the problem or the decision at hand.

In contrast, the domain expert need not know anything about the inner workings of computers or expert systems. Instead, the knowledge that the expert possesses about the problem or decision is the primary source of his or her contribution.

Of course, there need not be just one knowledge engineer or just one domain expert. Indeed there a host of benefits, including capturing the collective wisdom of the group, if multiple contributors are utilized. On the other hand, using a large group might increase the likelihood of conflicts between and among the experts and engineers. Such conflicts may not be altogether counterproductive, though. They may force the participants to evaluate the problem at hand and the solution derived more thoroughly. Depending on the situation, any combination of single or multiple knowledge engineers and domain experts may be appropriate.

The clients are employees, or other individuals, who will rely on the expert system as a decision tool. They may be executives, managers, production workers, or customers. They need not have extensive subject expertise and they need not have a proficiency with computers or expert system software--beyond that necessary to input their responses to the system's prompts via the keyboard.

The Processes

There are three major interactions that occur between the domain expert(s), the knowledge engineer(s), the clients(s), and the computer when an expert system is created and utilized.

The first is known as knowledge acquisition. This is the elicitation of relevant knowledge from the domain expert. This give-and-take relationship between the expert and the knowledge engineer is symbolized by the double headed arrow in the preceding diagram. Group meetings, individual interviews, and surveys are but a few of the mechanisms employed in this process. To insure that there is a permanent record of these interactions, they may be manually documented, tape recorded (audio), or videotaped (audio and video).

The second is known as knowledge representation. Here, the knowledge engineer transforms the expert's knowledge, extracted in the expert's parlance--naturally, into a language that the computer system will comprehend. The byproduct of this effort is the knowledge base--the knowledge of the expert in a form (i.e. set of rules) that the computer can understand.

Finally, client utilization occurs after the expert system is designed, programmed, and distributed to and used by decision makers, otherwise known as clients. In an interactional mode, this process may begin when the system poses a question, captures the user's response, decides which question to follow up with, and then does so. Alternatively, an expert system might require the user to pose a question to the computer and it would then respond with a question of its own. In a non-interactional setting, the expert system might utilize data from pre-existing sources. Such data may be point-in-time, such as that retained in a data base (i.e. an employee file), or real time, such as that obtained via a sensor or meter (i.e. a counter on a machine). Ultimately, all expert systems are designed to provide the client with a solution that reflects the judgmental processes that an expert would employ.

THE NUTS AND BOLTS OF EXPERT SYSTEMS

One advocate of expert systems technology, DuPont's Ed Mahler, advises those trying to introduce expert systems to consider avoiding the use of the expert systems nomenclature altogether. Apparently, for some, it conjures up the image of a futuristic, robotic state where machines are managing people rather than a setting where people are harnessing technologies to help them perform better.

In addition to this somewhat practical reason for shying away from the term expert system, there is also the issue of liability. The vulnerability and repercussions associated with

equating computer programs with human experts are not well understood. As a matter of fact, in the realm of artificial intelligence, there is a shift towards calling these systems knowledge based systems in order to dampen the credence ascribed to the term expert system.

A strategy that minimizes the use of the term expert system may be appropriate when the process of disseminating this technology is undertaken. The purpose of this paper, however, is to provide an introduction to expert systems. As such, we make note of this caveat but proceed using the standard terminology that has been developed over the last several decades.

The Purposes

Generically, expert systems can be used for scheduling, selecting, and diagnosing events. The following hypothetical human resource management scenarios should help to highlight these simple, yet profound, goals of expert systems and to illustrate how an expert system might be used in each of these settings.

For one, an expert system could be designed to <u>diagnose</u> the cause or causes of an employee turnover problem. To accomplish this, the system might move through a series of branched questions (What is the gender of most of the people resigning? Do they have dependents? Are they taking a job with another company? If so, are they reducing their work hours?) and eventually reason, for example, that the turnover problem is

attributable to inadequate child care options for working mothers.

An alternative purpose for an expert system could be to select from a group of applicants those that a company wishes to invite for plant visits. Once again, the answers to a sequence of branched questions (What is the applicant's degree? What is the applicants GPA? What is their work experience?) might result in the system recommending that a certain individual should move to this second phase in the selection process.

A third purpose for a human resource expert system could be to schedule a work force. A set of questions (What is the sales trend? Can part-time help be used? How much excess capacity is there?) may cause the system to recommend that more employees than normal be scheduled for a given shift, day, week, or season.

The promise of expert systems is that they permanently capture the often rare and expensive knowledge of valuable employees and use this knowledge to aid other decision makers faced with a host of different tasks. Given this generalizability, a transition from the preceding scenarios to employee reward, employee discipline, or employee development scenarios should not be difficult.

It is just as easy to envision an expert system being designed to help a supervisor diagnose the root cause of an employee performance problem, to help a manager select a pay level for a specific job, or to schedule a customized training sequence for an employee in a management development program.

Expert Systems: What They Are and What They Are Not

An informal, working definition of an expert system is "a computer based technology designed to aid decision makers." Formally, there are nearly as many definitions of expert systems as there are people developing them. Examples include the following:

> an artificial intelligence program that achieves competence in performing a specialized task by reasoning with a body of knowledge about the task and the task domain (Feigenbaum, McCorduck, and Nil, 1988).

> a computer-based system in which representations of expertise are stored and which allows a user to access this expertise in a way similar to that in which he might consult a human expert, with a similar result (Edwards and Connell, 1989).

Expert systems differ from traditional spreadsheet and data base management programs. Green (1987) succinctly highlights this difference. He states that, "Unlike a data base system, which simply stores, manipulates, and presents bits of information, an expert system stores, sorts, manipulates, and presents pre-packaged expertise using built-in logical powers of deduction to make judgmental decisions (p. 42)." Furthermore, some expert systems have the capability to not only derive solutions, but to explain the reasoning behind the questions that they posed and conclusions they arrived at.

The detailed examination of expert systems that follows reveals their complexity. Once some new terminology is mastered, though, it should become apparent that these tools are far from incomprehensible.

The Parts

To establish some common understanding, it will be useful to at least briefly introduce and discuss the various components of an expert system and then see how they fit together. Figure 2 on the following page has been provided to help facilitate this. As can be seen, there are three major components of an expert system: the knowledge base, the user interface, and the inference engine.

Before delving into each of these in more detail, two types of expert knowledge, which serve as the foundation for any system, need to be introduced.

Factual knowledge and heuristic knowledge are data that are comprised of a variable and a value for the variable. Take the statement "college degree is B.S. mechanical engineering" for instance. College degree is the variable and B.S. mechanical engineering is the value. Other examples of factual knowledge include: "pay satisfaction indicator is 9.0", "job experience equals 2 years", and "health care plan cost is $1,800." Alternatively, examples of heuristic knowledge, or rules of thumb, include "employees with international experience are more valuable", "students who contribute to their educational costs make better employees", and "the optimal work crew size for task X is 4 persons."

In an expert system, factual and heuristic knowledge are compiled into a knowledge base by the knowledge engineer, in consultation with the domain expert. The resultant collection of

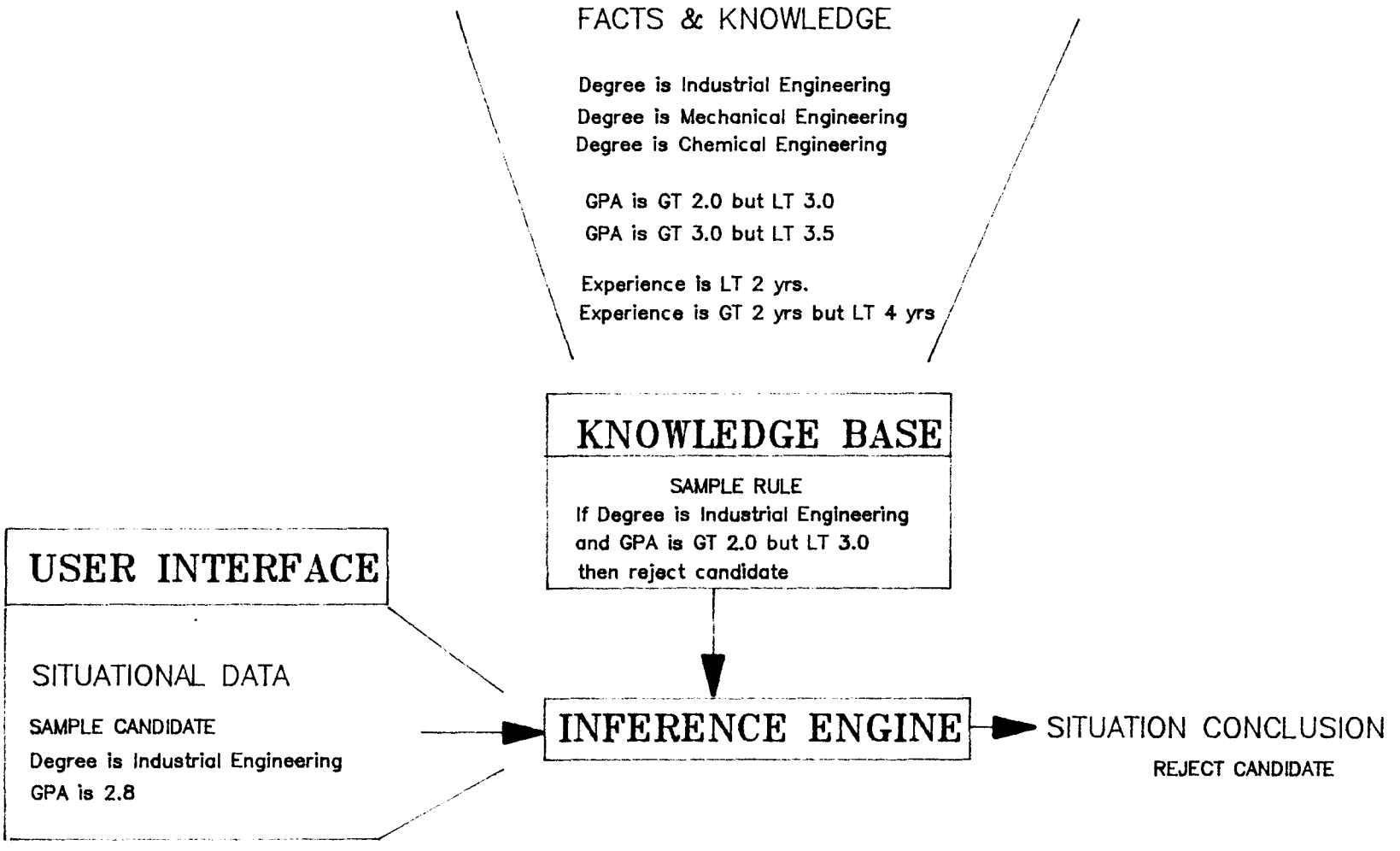

Figure 2 Expert Systems Components

knowledge, often represented in the form of rules, serves as one of the expert system's two forms of input. A typical if-then rule in a knowledge base would read as follows: "If variable equals value, then do the following."

In our applicant screening example, one rule in a knowledge base developed by an employer to screen resumes for an engineering job vacancy might read: "If college degree equals BS mechanical engineering, then reject candidate." Another rule might read: "If college degree equals AS industrial technology and experience exceeds four years, then retain candidate." As might be imagined, there are countless alternative combinations of variables (college degree, work experience, GPA, etc.) and values (B.S., B.A., 2 yrs., 5 yrs., 2.7, 2.8, 2.9, etc.) that could be combined to form legitimate rules.

The mechanism used to feed the situational data, that which is unique to the decision at hand, into the system is the second essential component of an expert system, the user interface. In its most visible role, the user interface serves as a bidirectional channel for the elicitation of relevant information from the decision maker; as a means for posing appropriate questions to the user and collecting the user's responses. For example, the user interface for a given system might be designed to pose the following question and then allow for it to be answered in any of three different ways. The system may ask, "What is the candidate's undergraduate degree?" and the user might respond by:

(1) Typing in "INDUSTRIAL ENGINEER" and pressing enter.

(2) Choosing among ten different word options that are presented by moving the cursor past the word "CIVIL ENGINEER" to the word "INDUSTRIAL ENGINEER" and pressing enter.

(3) Choosing among ten different degree options that are presented by moving the cursor past the SURVEYOR'S LEVEL depicted on the screen to the picture of the STOPWATCH and pressing enter.

The third and final component of an expert system is the inference engine. This is the reasoner, the heuristic information processor, of the system. This mechanism combines $input_1$, the knowledge base, and $input_2$, the situational data provided by the user via the user interface, analyzes these inputs, and arrives at a conclusion.

Recall the applicant screening example illustrated in Figure 2. There are likely to be numerous rules in this knowledge base, one of which may be, "If college degree equals BS mechanical engineering, then reject candidate". The inference engine would combine this rule with the user's "BS Industrial Engineering" response to the "What is college degree?" question. Obviously, the inference engine would decide not to reject the candidate at this juncture. If the candidate has a G.P.A. of 2.8, however, she could be rejected at the next hypothetical decision node, "If college degree equals BS industrial engineering and G.P.A. is below 3.0, then reject candidate", or at any subsequent decision point thereafter.

Types of Expert Systems

Some expert systems, the fully loaded system is an appropriate description, are created with all three components

incorporated in the system. Knowledge and facts are organized into a knowledge base which is integrated with the inference engine and the user interface. In many cases, a customized system such as this is useful for a single application only.

Alternatively, an expert system shell can be used. In this case, an empty knowledge base is combined with an inference engine and a user interface.

Expert system shells are highly flexible. Any type of knowledge base (i.e. automotive, personnel, accounting, or agricultural applications) could be plugged into the same software package. Within the realm of human resource management, the same shell could be used with a candidate selection knowledge base, an employee benefits selection knowledge base, or an employee overtime scheduling knowledge base.

In sum, generically speaking, expert systems include a knowledge base (the set of decision rules), an inference engine (the reasoner), and a user interface (the communication channel between the user and the computer). Using an expert system shell (an expert system not limited to a single knowledge base), allows for multiple, unrelated applications to run using the same software.

Technical advances in the design of expert systems, particularly expert system shells, have made these tools more accessible, more affordable, and more powerful. Indeed, many of the technical features that these systems now utilize are all but transparent to the end user, the client.

EXPERT SYSTEMS AND HRM

We now turn to the fundamental question: "What is the potential usefulness for expert systems in aiding those making human resource management decisions?"

The uniqueness of HRM decisions and the costs of expert systems technology may be the first set of issues that skeptical managers or employees might raise.

Certainly, any human resource management event that includes two actors, an applicant and a manager for instance, is a unique interaction. Many HR transactions, though, are very similar. The actors, time, and place may change, but the event retains a core set of properties. A manager is called upon to evaluate many resumes, not just one. Many managers evaluate resumes, not just one. Applicant screening is performed in many time periods, not just once.

With respect to the cost issue, certainly the costs associated with hiring a poor performing employee can be enormous. Such costs, however, pale in comparison to the millions and tens of millions associated with: sunk costs incurred when a dry hole is drilled in the oil field, malpractice awards for an incorrect disease diagnosis, or replacement costs for an improperly maintained turbine. It should come as no surprise that expert systems are indeed used, quite successfully, for oil and gas exploration, medical diagnosis, and major equipment maintenance (Harmon, Maus, and Morrissey, 1988).

Another set of issues center on the availability of computer hardware, software, and expertise.

Personal computer technology, by now, has been widely adopted by practitioners in the field of human resource management. In many companies it is not uncommon for each professional to have their own computer, or easy access to a machine. A survey conducted by Personnel has confirmed this, even for a sample in which nearly half the respondents were relatively small companies employing between 100 and 999 employees (Welo, 1990). They found that in 82% of the companies surveyed, the HR department claimed that they used one or more personal computers (p. 37).

Of late, there has also been a boom in the development and proliferation of human resource management software. Internal staffing, executive succession planning, compensation administration, and employee record keeping programs are but a few examples. Phenomenal growth is expected to continue in this area. International Data Corp., an industry analyst, projects that the annual market for HR software will almost double from $398 million in 1989 to $730 million by 1993 (Stamps, 1990).

Among others, Broderick and Boudreau (1990) have identified how human resource management departments are successfully adopting existing computer hardware and software to help them better manage the people they are responsible for.

Finally, graduates of human resource management programs from schools such as Cornell University are increasingly putting

the power of this hardware and software to use. Courses such as "Personal Computer Basics", "Personal Computer Applications in Human Resource Management and Labor Relations", and "Personnel Information Systems" as well as independent projects in other courses are the means by which students are acquiring this skill.

Additionally, many companies have chosen to make computer instruction available or mandatory for all of their human resource professionals. For instance, Shering-Plough, I.B.M., Mobil, N.C.R., and others, provide aspiring executives with intensive, formal computer instruction as part of their management development programs.

So, it appears there is adequate computer hardware and attainable, if not already available, expertise for human resource management departments to adopt the expert systems technology. To further examine the potential usefulness question, two additional issues must be considered. "What type of expert system software is available?" And, "What type of expert system applications have been developed for human resource management?"

Expert System Software Availability

In an expert system shell product survey which we conducted, over two dozen expert system shells were identified. Table 1 on the following page lists these applications. As can be seen, PC versions of these shells range in price from $145 to $5,000. A very good PC-based expert system shell can be had for less than $1,000. It is important to note that when a shell is purchased

Table 1 Expert System Shells

Shell Name	Shell Vendor	Approximate Costs		Compat-ability
		Purchasing Fee ($)	Annual Maintanance Fee ($)	Compatible with various Databases (Lotus, DBase, etc.)
Action!	ExperTelligence	3000	0	No
ADS-PC	Aion Corporation	7000	0	Yes
Arity / Expert	Arity Corporation	650	95	No
ART-IM	Inference Corporation	8000	100	Yes
ESP	Expert Systems International	145	0	Yes
Expert87	Magic7 Software	495	0	Yes
EXSYS	Exsys	795	0	Yes
GEN-X	General Electric	Not Yet Available		Yes
Goldworks	Gold Hill Computers	7900	1295	Yes
GURU	Micro Data Base Systems	6500	975	Yes
KDS3	KDS Corporation	1495	0	Yes
Knowledge Engineering System	Software A&E	4000	0	Yes
Knowledge Pro	Knowledge Garden	695	0	Yes
Knowledge Product Environment	IntelliCorp	3500	850	Yes
Level5	Information Builders	995	0	Yes
MPROLOG	LogicWare	539	108	No
NExpert	Neuron Data	5000	1000	Yes
OPS/83	Production Systems Technologies	2000	0	Yes
Personal Consultant Easy	Texas Instruments	495	0	Yes
RuleMaster3	Radian Corporation	595	0	Yes
The Intellignece Machine Model	General Research	1900	0	Yes
The following shells are only available on Workstations or Mainframes				
KDS-VOX (Voice Regognition System)	KDS Corporation	15,000	0	Yes
Knowledge Craft	Carnegie Group	20,880	2880	No
Real-Time AI	Intellisys	250,000	0	Yes
Vax Decision Expert	Digital Equipment	10,000	300	Yes

Additional information available from Center for Advanced Human Resource Studies (prices subject to change)

the buyer may get more than just the shell. Many software vendors allow purchasers to make infinite copies of a runtime version of their expert system. This runtime version option allows the purchaser to clone and distribute a given application, a resume screening device for instance, throughout their organization at little or no additional cost.

The purpose of this paper is not to review each of these shells in detail, rather it is to point out the availability of this technology and its applicability for HRM. Suffice it to say that there are ample alternatives, and new shells are being developed continuously. Future projects will evaluate the advantages and disadvantages of the array of available options.

As noted, expert system shells have become simpler for the user and at the same time increasingly powerful. Our experience suggests that anyone who has a working knowledge of commonly used spreadsheet or data base management software packages, or has a working knowledge of a computer language like C, Fortran, Pascal, LISP, or PROLOG, could become productive on an expert system in less than a month and proficient in four to six months.

Expert System Applications in HRM

It should come as no surprise that given the availability of this technology and the abundance of human resource decisions to be made, some companies and consultants are aggressively putting this technology to use.

Our survey of the published applications, for both vendors and companies, which appears on the following page (Table 2) is an indication of how quickly this technology is being adopted. As recently as 1989 a survey of 247 HR software vendors found only eight who marketed expert systems (Briggs and Doney, 1989).

It appears that most of the three dozen applications identified fall into either the Training/Development category or the Planning/Scheduling category. Also, it is interesting to note that there is no standard formula for the development of these systems. They have been designed internally as well as externally and have utilized customized expert systems and expert system shells alike.

Expert Systems: Costs vs. Benefits

Whether purchasing an expert system shell off-the-shelf or purchasing a pre-developed human resource expert system from a vendor, like some of those in Table 2, a key consideration has to be costs. Indeed some writers often cite what appear to be astronomical costs for developing an expert system. For instance, Waterman (1986) estimates that a moderately difficult expert system may take six person years to develop and that difficult systems may take as many as 15-20 person years to develop.

On the other hand, DuPont's Mahler claims that it takes one to two months to develop a typical PC-based system at a cost of $10,000, and first year returns are alleged to average $150,000; a payback of 15 to 1 (Kirrane and Kirrane, 1989).

Table 2 HRM Expert Systems

Application Name	Application Domain	Target User		Extent of Use		Basis of Knowledge			Computer Output					Developing Company		Programming Method	
		Employee	Employer	Used by a Single Company	Used by Multiple Companies	Preexisting Data	Questionnaires	Individual Session	Diagnosis	Action Plan	Schedule	Projected Consequences	Management Report	In-House Developed	Developed by Another Firm	Expert System Shell	Programming Language
Orion	Benefits		X		X	X							X		X		
Pension Advisor	Benefits	X		X		X		X	X						X		
Pension Scheme Manager	Benefits		X		X	X			X							X	
Manager Bonus Evaluator	Compensation		X		X	X			X						X	X	
HyperManual	Employee Relations	X			X	X		X	X						X		
Personnel Policy Expert	Employee Relations		X		X	X				X					X		
Identifying Criteria for Success	Job Analysis		X		X			X		X			X		X		
Paryns	Job Analysis		X	X		X	X			X			X	X			
Management Feedback	Performance Appraisal		X		X		X			X					X		X
Performance Management	Performance Appraisal		X		X			X		X					X		X
Performance Mentor	Performance Appraisal		X		X			X		X					X		
Personnel Evaluator Assistant	Performance Appraisal		X		X	X							X		X	X	
Team Evaluation and Management	Performance Appraisal		X		X	X				X					X		X
Direct Labor Management System	Planning / Scheduling		X	X				X		X					X	X	
Dynamic Rescheduler	Planning / Scheduling		X	X				X			X	X			X	X	
Labor Scheduler Module (ROI)	Planning / Scheduling		X		X	X		X		X	X			X			
Master Scheduling Unit	Planning / Scheduling		X	X		X					X				X	X	
Part-timers Scheduler	Planning / Scheduling		X		X	X	X				X			X			X
Planit	Planning / Scheduling		X		X					X					X	X	
Ship Maintenance Rescheduler	Planning / Scheduling		X	X		X		X		X	X			X		X	
CV Expert	Staffing		X		X		X		X						X	X	
Interviewing Module (ROI)	Staffing		X		X		X			X				X			
Teckchek	Staffing		X		X			X	X						X		
Acumen	Training / Development		X		X			X		X					X		
CompuCOACH	Training / Development		X		X		X	X		X					X		X
Expert Media System (EMS)	Training / Development		X		X			X		X					X		X
Judgment Exercisers for Managers	Training / Development		X		X			X				X			X		
Leadership Practices Renewal	Training / Development	X			X			X				X			X		X
LISP-ITS	Training / Development		X		X	X		X	X					X			X
Maintenance Assistant	Training / Development	X		X				X				X		X			
PD/ICAT	Training / Development	X		X				X				X		X		X	
Recovery Boiler Tutor (RBT)	Training / Development	X			X			X				X		X			
Skills Management System	Training / Development		X		X	X				X			X	X			
Skills Training Module (ROI)	Training / Development	X			X			X	X	X				X			
SMG Training Programs	Training / Development	X			X			X				X		X			
Technology and Transfer Program	Training / Development	X		X				X							X	X	

Additional information available from Center for Advanced Human Resource Studies

As discussed previously, our experience suggests that an expert system shell can be had for less than $1,000 and that one-time training costs of 3-4 months' salary would probably be required. Combining a fraction of these initial costs with those necessary to obtain the inputs of domain experts, knowledge engineers, and clients a given HRM project is likely to accrue costs in the tens of thousands of dollars. Unfortunately, payoffs in the realm of HRM have not yet been well studied.

Other Benefits

Another key question is, "What other tangible benefits should be expected from expending time, energy, and money on an expert system project?" In sum, four major benefits are usually claimed by advocates and users.

First, it is often asserted that the bias-free, tireless, and better informed expert system will make superior decisions when pitted against unreliable, fallible humans. Second, the expert system development process requires that the problem is well specified. Often, expert system development procedures call for a thorough assessment of the problem by a group of experts. This facilitates the incorporation of multiple perspectives and at the same time provides a set of checks and balances. Third, expert systems can serve as useful training devices. They are perfectly reliable and may generate less stress for the trainee than human instructors. Fourth, expert systems help to foster knowledge retention within the firm and knowledge dissemination throughout it. By tapping the collective knowledge of a group of

experienced experts, the firm has the chance to recoup some of the investment it has made in its employees. Furthermore, the distribution of expert knowledge to others within the corporation becomes as easy and cheap as mailing a diskette. The cost is likely to be less than several dollars, the combined cost of the diskette and delivery.

Human Interface

One important, emotional question remains, "how will people react to the implementation of these systems?"

Losing managerial control and offending employees are some of the concerns that might be likely to surface. Each of these appears to have a legitimate genesis. If HR professionals aren't making every decision, how will they control them, and, furthermore, what will they do to occupy their time? Perhaps they'll spend it mollifying countless employees who feel dehumanized as a result of using or otherwise being affected by these systems!

There is, however, ample cause for a less cynical view--one that recognizes the important contributions that are often made by the domain experts and knowledge engineers who develop these systems.

Recall the previous discussion of the benefits of expert systems. It was there that the issue of consistency was first broached. Indeed, a case could easily be made that the use of an expert system will serve to increase HRM's control rather than erode it. A human resource management department that spearheads

the design of a resume screening expert system and then delegates this task to the supervisory work force may in one sense lose control. The stronger case, though, is that by insuring that all supervisors use a common, reliable system (unlike any system used in the HR department in all likelihood), the department's degree of control will actually increase.

To explore the second human interface question, employee reactions, we initiated the Center for Advanced Human Resource Studies Expert System Pilot Project.

C.A.H.R.S. Expert System Pilot Project

The primary goal of this initial project was to explore the application of the expert systems technology to a problem in the realm of human resource management. Two subgoals were also established: (1) to derive a model that mimics an expert and (2) to examine employee responses to the system. To facilitate this inquiry, we designed and tested a system to aid employees in their flexible benefit selection process.

This expert system took employee responses (situational data) to a series of questions and used a model designed to minimize their costs and risks to generate a recommendation as to how they should allocate their benefit points. The derivation of this model helped us realize our first subgoal: to model the decision processes and expertise of an expert.

For instance, our system might have concluded that a given individual should enroll in Health Plan A at a cost of 1800 points, Life Insurance Plan C at a cost of 300 points, and so on.

The outcome of the program was an on-screen rendering of the firm's benefit enrollment form with the computer-generated plan choices and point allocations.

To garner a feel for employee attitudes toward expert systems and address the second of our subgoals, we captured the reactions of a set of decision makers, employees in a Fortune 100 firm, to the expert system we designed.

Employees representing diverse populations on age, marital status, gender, and number of dependents dimensions (e.g. a single mother with two children, an individual whose spouse had retired, an individual whose spouse was employed by the same firm) participated in this experiment. These individuals were asked to answer both work-related questions, such as, "What is your salary?", and personal questions such as, "How much of your household income do you save?", "What is your annual household income?", and "What is your net worth?".

After using the system, which generated a set of benefit choices for them, we asked the participants to respond to a 14-item questionnaire. The results of this survey appear on the following page (Table 3). In general, the individuals felt that the system could speed up the decision process (Q. 4), and they found it unobtrusive (Q. 6). It was not surprising that they would be unwilling to let the computer unilaterally make their benefit choices for them (Q. 7).

Although there were a limited number of subjects for this exercise, these data provide some evidence that on average